CLAIMS

1.   Method of data-packet transmission from a first network to a second network, one of the networks being a communications bus transporting data packets of isochronous and asynchronous types, characterised in that, with the other network being a packet-switching network, the said method includes, performed within a communications device connected to the communications bus and forming part of the packet-switching network, a step of reserving resources adapted to the types of data packets intended for the second network.

2.   Method according to Claim 1, characterised in that the reserving of resources in so-called connected mode takes place at least on the second network in the case of the isochronous data packets.

3.   Method according to Claim 1 or 2, characterised in that the reserving of resources in so-called connected mode also relates to resources internal to the communications device.

4.   Method according to Claim 3, characterised in that, in the case of the isochronous data packets, the reserving of resources internal to the communications device is performed on the basis of the resources reserved on the second network.

5.   Method according to Claim 3 or 4, characterised in that the internal resources adapted to the isochronous packets comprise at least one memory area of a dual-port memory-storage unit.

6.   Method according to one of Claims 3 to 5, characterised in that it includes a step of storage of isochronous data packets in the reserved internal resources.

7.   Method according to one of Claims 3 to 6, characterised in that it includes a step of transfer of isochronous data packets between the reserved internal resources and a means of interfacing with one of the networks.

8.   Method according to one of Claims 1 to 7, characterised in that the reserving of resources for the isochronous data packets is performed before a step of reception of the packets within the communications device.

9. Method according to one of Claims 1 to 8, characterised in that, in the case of the asynchronous data packets, the reserving of resources in so-called connected mode relates only to the resources internal to the communications device.

5   10. Method according to Claim 9, characterised in that the internal resources adapted to the asynchronous packets comprise at least one memory area of a storage means (RAM) associated with a central processing unit (CPU) internal to the communications device.

11. Method according to Claim 10, characterised in that it
10   includes a step of storage of asynchronous data packets in the storage means (RAM).

12. Method according to one of Claims 9 to 11, characterised in it includes a step of intermediate storage of the asynchronous data packets in a dual-port memory-storage unit.

15   13. Method according to Claim 12, characterised in that it includes a step of transfer of asynchronous packets between the dual-port memory-storage unit and the storage means (RAM) when the second network is a communications bus.

14. Method according to one of Claims 1 to 13, characterised in
20   that it includes a packet-switching step, performed within the communications device connected to the communications bus and forming part of the packet-switching network.

15. Method according to Claim 14, characterised in that the packet-switching step consists in receiving a packet coming from the first
25   network, in analysing the header of the packet in order to ascertain its destination and in forwarding the said packet towards the said destination.

16. Method according to Claim 12, characterised in that it includes a step of transfer between the storage means (RAM) and the dual-port memory-storage unit when the second network is the packet-switching
30   network.

17. Method according to one of Claims 9 to 13, characterised in that the reserving of internal resources adapted to the asynchronous packets is performed after a step of reception of an asynchronous packet.

18. Method according to one of Claims 9 to 13, characterised in
35   that the reserving of internal resources is performed packet by packet.

19. Method according to one of Claims 1 to 18, characterised in that, when the first network is the communications bus, it includes:

- a step of determining, within a communications device known as source device connected to the communications bus and forming part of the packet-switching network, for each item of information which it has to transmit, of a path to make the said item of information follow on the said switched network,

- an information step, in the course of which the said source communications device broadcasts, intended for all the other communications devices of the network, information representative of the bandwidth necessary to carry out transmission in connected mode, and

- a step of allocating bandwidth in the course of which, on the one hand, the bandwidth which is necessary for them is allocated to the transmissions in connected mode and, on the other hand, all or part of the bandwidth available is allocated to each transmission to be made in non-connected mode.

20. Method according to Claim 19, characterised in that, for establishing a connection, it includes:

- performed by the source communications device intended to transmit information on the said path, a step of transmitting to each communications device placed on the said path, called "intermediate" device, of information representative of the bandwidth necessary for the said connection.

21. Method according to Claim 19 or 20, characterised in that, for each information transmission, it includes a step of flow control performed by the source communications device for the path followed by the said information.

22. Method according to any one of Claims 19 to 21, characterised in that it includes a step of information transmission taking account of several levels of priority.

23. Method according to Claim 22, characterised in that at least one priority level is allocated to transmission in non-connected mode.

24. Method according to Claim 22 or 23, characterised in that, in the course of the bandwidth allocation step, the bandwidth associated

with the priority level corresponding to the non-connected mode varies as a function of a duration not having given rise to any transmission.

25. Method according to one of Claims 1 to 24, characterised in that the resources internal to the communications device are released when the packet has been forwarded on the second network.

26. Method according to one of Claims 1 to 25, characterised in that, when the second network is the packet-switching network, the reserving of resources for the isochronous packets relates to the establishing of a connection on this network.

27. Method according to one of Claims 1 to 26, characterised in that the resources reserved in connected mode on the second network are released when the connection is terminated.

28. Method according to claim 1, characterised in that the communications bus is a serial bus which defines a cycle time as a period of time corresponding to an interval at which the isochronous data packets are transmitted in the serial bus, and in that the step of reserving resources is carried out in a plurality of modes, the plurality of modes including a first mode in which data storing capacity is reserved in the communications device for storing the isochronous data packets before the isochronous data packets are transmitted via the communications device, and a second mode in which data storing capacity is reserved in the communications device for storing the asynchronous data packet after the communications device receives the asynchronous data packet .

29. Method according to claim 28, characterised in that the data storing capacity reserved in the first mode is prepared for a series of the isochronous data packets transferred in a plurality of the cycle times and the data storing capacity reserved in the second mode is prepared for each asynchronous data packet.

30. Method of transmitting data packets of isochronous and asynchronous types between two interconnected communications buses, characterised in that the said buses are interconnected by a packet-switching network, the said method including a step of reserving resources on the packet-switching network adapted to the types of packets originating from a first bus and intended for the second bus.

31. Method according to Claim 30, characterised in that the method includes a step of reserving resources on the second bus adapted to the types of packets originating from the first bus and intended for the said second bus.

32. Method according to Claim 30, characterised in that the step of reserving resources adapted to the isochronous packets on the packet-switching network is performed more particularly:

- within a communications device known as source device connected to the first bus and forming part of the packet-switching network,

- within a communications device known as destination communications device connected to the second bus and forming part of the packet-switching network,

- on the packet-switching network between the said source and destination devices.

33. Method according to one of Claims 30 to 32, characterised in that it includes:

- a step of determining, within a communications device known as source device connected to the first communications bus and forming part of the packet-switching network, for each item of information which it has to transmit, of a path to make the said information follow on the said switched network,

- for the said source communications device which has to transmit in connected mode, an information step in the course of which the said communications device broadcasts, to all the other communications devices of the network, information representing the bandwidth necessary for the said transmission in connected mode, and

- a step of allocating bandwidth in the course of which, on the one hand, the bandwidth which they need is allocated to the transmissions in connected mode and, on the other hand, all or part of the bandwidth available is allocated to each transmission to be made in the non-connected mode.

34. Method according to Claim 33, characterised in that, for establishing a connection, the method includes:

- performed by the source communications device intended for transmitting the information on the said path, a step of transmitting to each

communications device placed on the said path, called "intermediate" device, of information representative of the bandwidth necessary for the said connection, and

- performed by each intermediate communications device on the said path, an step of determining the availability of the link leading to the next communications device on the said path and, in the event of unavailability, an step of transmitting to the source communications device of information representing the unavailability of the said path.

35. Method according to Claim 34, characterised in that it includes, for each information transmission, a step of flow control performed by each of the intermediate communications devices on the path followed by the said information.

36. Method according to any one of Claims 33 to 35, characterised in that it includes a step of information transmission taking account of several levels of priority.

37. Method according to Claim 36, characterised in that at least one priority level is allocated to transmission in non-connected mode.

38. Method according to Claim 36 or 37, characterised in that, in the course of the bandwidth-allocation step, the bandwidth associated with the level of priority corresponding to the non-connected mode varies as a function of a duration not having given rise to any transmission.

39. Method according to claim 30, characterised in that the two communications buses are the same type of serial buses each of which defines a cycle time as a period of time corresponding to an interval at which the isochronous data packets are transmitted in the serial buses, and in that the step of reserving resources is carried out in a plurality of modes, the plurality of modes including a first mode in which data storing capacity is reserved in the packet switching network for storing the isochronous data packets before the isochronous data packets are received by the packet switching network and a second mode in which data storing capacity is reserved in the packet switching network for storing the asynchronous data packet after the packet switching network receives the asynchronous data packet.

40. Method according to claim 39, characterised in that the data storing capacity reserved in the first mode is prepared for a series of

the isochronous data packets transferred in a plurality of the cycle times and the data storing capacity reserved in the second mode is prepared for each asynchronous data packet.

41. Communications device providing for data packets to be transmitted from a first network to a second network, one of the networks being a communications bus transporting data packets of isochronous and asynchronous types, characterised in that the device, being connected to the said bus and forming part of a packet-switching network constituting the other network, includes means for reserving resources adapted to the types of data packets intended for the second network.

42. Device according to Claim 41, characterised in that the means for reserving resources are arranged at least on the second network in the case of the isochronous data packets.

43. Device according to Claim 41 or 42, characterised in that the reserving of resources also relates to resources internal to the communications device.

44. Device according to Claim 43, characterised in that, in the case of the isochronous data packets, the means for reserving resources internal to the communications device reserve resources on the basis of the resources reserved on the second network.

45. Device according to Claim 43 or 44, characterised in that the means for reserving internal resources adapted to the isochronous packets reserve at least one memory area of a dual-port memory-storage unit.

46. Device according to one of Claims 41 to 45, characterised in that, when the second network is the packet-switching network, the reserving of resources for the isochronous packets relates to the establishing of a connection on this network.

47. Device according to one of Claims 43 to 46, characterised in that it includes a means for storage of isochronous data packets in the reserved internal resources.

48. Device according to Claims 43 to 47, characterised in that it includes means for transfer of isochronous data packets between the reserved internal resources and a means of interfacing with one of the networks.

49. Device according to one of Claims 41 to 48, characterised in that the reserving of resources for the isochronous data packets is performed before a step of reception of the packets within the communications device.

5   50. Device according to Claim 41 or 49, characterised in that, in the case of the asynchronous data packets, the reserving of resources relates only to the resources internal to the communications device.

51. Device according to Claim 50, characterised in that the internal resources adapted to the asynchronous packets comprise at least 10   one memory area of a storage means (RAM) associated with a central processing unit (CPU) internal to the communications device.

52. Device according to Claim 50 or 51, characterised in that it includes a means for intermediate storage of asynchronous data packets in a dual-port memory-storage unit.

15   53. Device according to Claim 52, characterised in that it includes a means for transfer of asynchronous packets between the dual-port memory-storage unit and the storage means (RAM) when the second network is a communications bus.

54. Device according to Claim 52, characterised in that it 20   includes a means for transfer between the storage means (RAM) and the dual-port memory-storage unit when the second network is the packet-switching network.

55. Device according to one of Claims 50 to 54, characterised in that the reserving of internal resources adapted to the asynchronous 25   packets is performed after a step of reception of an asynchronous packet.

56. Device according to one of Claims 50 to 55, characterised in that the reserving of internal resources is performed packet by packet.

57. Device according to one of Claims 41 to 56, characterised in that it includes a packet-switching means within a communications 30   device known as source device connected to the communications bus and forming part of the packet-switching network.

58. Device according to Claim 57, characterised in that the packet-switching means comprise at least one means for receiving packets arriving on its ports, a means of analysing the header of the said packets,

and a means of transmitting the said packets on the port decoded by the said analysis means.

59. Device according to one of Claims 41 to 58, characterised in that it is able, for each item of information which it has to transmit, to
5   determine the path to make it follow on the network and a transmission mode, connected or non-connected, the said device including:

- an information means suitable, for each transmission in connected mode, to broadcast, to all the other communications devices of the network, information representing the bandwidth necessary for the said
10   transmission in connected mode, and

- a means for allocating bandwidth, able to allocate, on the one hand, the bandwidth which they need to the transmissions in connected mode and, on the other hand, all or part of the bandwidth to each transmission to be made in non-connected mode.

15   60. Device according to Claim 59, characterised in that, for establishing a connection, the information means is able to transmit, to each communications device placed on the said path, called "intermediate" device, information representative of the bandwidth necessary for the said connection.

20   61. Device according to Claim 59 or 60, characterised in that it includes a means for flow control able, for each information transmission in the non-connected mode, to verify the availability of the path followed by the said information.

62. Device according to any one of Claims 59 to 61,
25   characterised in that it includes a means for information transmission taking account of several levels of priority.

63. Device according to Claim 62, characterised in that the transmission means is suitable for the situation in which at least one priority level is allocated to transmission in non-connected mode.

30   64. Device according to Claim 62 or 63, characterised in that the bandwidth-allocation means is suitable for the situation in which the bandwidth associated with the level of priority corresponding to the non-connected mode varies as a function of a duration not having given rise to any transmission.

65. Device according to Claim 64, characterised in that the bandwidth-allocation means is suitable for the situation in which the said duration is the duration separating the last transmission in non-connected mode and the next transmission in connected mode.

5   66. Communications device according to claim 41, characterised in that the communications bus is a serial bus which defines a cycle time as a period of time corresponding to an interval at which the isochronous data packets are transmitted in the serial bus and in that the means for reserving resources has a plurality of modes, the plurality of

10   modes including a first mode in which data storing capacity is reserved in the communications device for storing the isochronous data packets before the isochronous data packets are received by the communications device and a second mode in which data storing capacity is reserved in the communications device for storing the asynchronous data packet after the

15   packet switching network receives the asynchronous data packet.

67. Communication device according to claim 66, characterised in that the data storing capacity reserved in the first mode is prepared for a series of the isochronous data packets transferred in a plurality of the cycle times and the data storing capacity reserved in the second mode is

20   prepared for each asynchronous packet.

68. Data processing apparatus, characterised in that it is associated with a device according to one of claims 41 to 67 and that the apparatus processes image data to be transmitted through the device according to one of claims 41 to 67 and/or processes image data received

25   from the device.

69. Communications network including at least two interconnected communications buses each transporting data of isochronous and asynchronous types, characterised in that the said network includes a packet-switching network which interconnects the said

30   buses and which is able to transmit, from the first bus to the second bus, data packets of isochronous and asynchronous types conveyed by the said first bus.

70. Communications network according to Claim 69, characterised in that the packet-switching network is able to reserve

35   resources adapted to the types of data packets to be transmitted.

71.   Network according to Claim 69 or 70, characterised in that it includes several communications devices forming part of the packet-switching network, one of the devices, called source device, being connected to the first communications bus and:

5   - being suitable, for each item of information which it has to transmit, for determining a path to make the said item of information follow on the said switched network,

- including an information means suitable for broadcasting, intended for all the other communications devices of the switched network, 10   information representative of the bandwidth necessary for the said transmission in connected mode, and

- including a bandwidth-allocation means suitable for allocating, on the one hand, to the transmissions in connected mode, the bandwidth which is necessary for them and, on the other hand, all or part of the 15   bandwidth available to each transmission to be made in non-connected mode.

72.   Network according to Claim 71, characterised in that, for establishing a connection:

- the source communications device intended to transmit 20   information on the said path is able to transmit, for each communications device placed on the said path, called "intermediate" device, information representative of the bandwidth necessary for the said connection, and

- each intermediate communications device on the said path is able to determine the availability of the link leading to the next 25   communications device on the said path and, in the event of unavailability, to transmit, to the source communications device, information representative of the unavailability of the said path.

73.   Network according to Claim 72, characterised in that each intermediate communications device on the path includes a flow-control 30   means suitable, for each information transmission, for verifying the availability of the path followed by the said information.

74.   Network according to any one of Claims 71 to 73, characterised in that each device having to transmit information includes an information-transmission means taking account of several levels of priority.

75. Network according to Claim 74, characterised in that at least one priority level is allocated to the transmission in non-connected mode.

76. Network according to Claim 74 or 75, characterised in that the bandwidth-allocation means is suitable for the situation in which the bandwidth associated with the priority level corresponding to the non-connected mode varies as a function of a duration not having given rise to any transmission.

77. Communications network according to claim 69, characterised in that the communications buses are the same type of serial buses each of which defines a cycle time as a period of time corresponding to an interval at which the isochronous data packets are transmitted.

78. Communications network according to claim 77, characterised in that the packet switching network includes means for reserving memory areas therein, the reserving means having a plurality of modes which includes a first mode in which data storing capacity is reserved for storing the isochronous data packets before the isochronous data packets are received by the packet switching network and a second mode in which data storing capacity is reserved for storing the asynchronous data packet after the packet switching network receives the asynchronous data packet.

79. Communication device according to claim 78, characterised in that the data storing capacity reserved in the first mode is prepared for a series of the isochronous data packets transferred in a plurality of the cycle times and the data storing capacity reserved in the second mode is prepared for each asynchronous packet.

80. Communications network including at least two interconnected communications buses, each transporting data of isochronous and asynchronous types, characterised in that the said network includes a packet-switching network including at least one communications device according to one of Claims 41 to 67 which is connected to one of the buses constituting a network.

81. Communications network according to Claim 80, characterised in that the packet-switching network includes at least one

communications device according to one of Claims 41 to 67 which is connected to the other bus also constituting a network.

82. Communications network according to Claim 80, characterised in that the communications network includes at least one

5 data processing apparatus according to claim 68 which is connected to one of the buses also constituting a network.

83. An information-storage means, possibly completely or partially removable, which can be read by a computer or a processor containing instructions of the computer program, characterised in that it

10 allows implementation of the method according to one of claims 1 to 40.

84. An information-storage means, which can be read by a computer or a processor containing data originating from the implementation of the method according to one of claims 1 to 40.

85. A computer program loadable into a programmable device,

15 including sequences of instructions for implementing the steps of the method according to one of claims 1 to 40, when said program is run on the programmable deive.